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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/721,870

11/26/2003

Kengo Inoue

032136

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38834

7590

01/06/2005

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EXAMINER

EVERHART, CARIDAD

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 01/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,870

Applicant(s)

INOUE ET AL.

Examiner

Caridad M. Everhart

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-18 is/are allowed.
- 6) ☒ Claim(s) 1,7,9,19-24,26-29 and 31-34 is/are rejected.
- 7) ☒ Claim(s) 2-6,8,25 and 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2-23-04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Applicant's arguments with respect to claims 1-3,6,9,24, 26, and 27 have been considered but are moot in view of the new ground(s) of rejection.

Applicant has amended to include the limitation "in direct contact with" in relation to the silicon nitride and the first liner insulating layer.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Heo, et al. (US 2004/0171271A1).
Heo et al disclose forming a silicon nitride polishing stopper layer on a pad oxide layer(paragraph 0030, first line and paragraph 0032). A trench is formed by etching the layer and the substrate(paragraph 0032, first line). A liner of thermal silicon oxide is formed in the trench(paragraph 0035, first line), and an lpcvd layer of nitride is formed of

a thickness greater than 20nm(paragraph 0035). The fill layer is a CVD oxide (paragraph 0043). The next step is a polish step, and the polish stop is then etched(paragraph 0044 and 0046).

Although Heo et al is silent with respect to plasma cvd, it is understood that the deposition method may be plasma cvd, since it is disclosed that the oxide may be HDP oxide(paragraph 0043), which is a plasma oxide.

Claim Rejections - 35 USC § 103

Claims 7,19-24,26-29,31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heo et al as applied to claim 1 above and further in view of Laxman, et al (US 5,874,368).

Heo et al is silent with respect to the source gas for the lpcvd nitride disclosed by Heo et al as cited above and with respect to the anneal step.

Laxman et al disclose butylaminosilane as a source for lpcvd nitride for isolation liner layer(col. 1, lines 10-16 and col. 4, lines 10-14 and table 1). Ammonia is also a source gas(col. 2, lines 11-15). Because of the organic source material, carbon will be incorporated into the nitride layer(table 1). The temperature of formation includes the recited range(table 1 and claim 8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the nitride taught by Laxman et al with the process taught by Heo et al because Heo et al teach lpcvd nitride and Laxman et al teach an lpcvd nitride which is useful for isolation liner layers with properties improved over the prior art (table 1).

With respect to the p-channel or cmos devices formed on the semiconductor substrate, these are conventional in the art and require isolation structures such as those taught by Heo et al , so that it would have been obvious to one of ordinary skill in the art at the time of the invention to have formed p-channel devices and CMOS devices on areas of the substrate separated by the isolation structures formed by Heo et al and by Heo et al in view of Laxman et al.

With respect to the anneal step, it is conventional in the art to densify the insulation fill in the forming of isolation structures, and the temperature range is within the ordinary skill in the art to determine so that it would have been obvious to one of ordinary skill in the art at the time of the invention to have annealed the structure taught by Heo et al at the recited temperature range.

With respect to the formation of a divot,as recited in claim 26, Heo et al show in Fig. 3 that the divot formation is formed in the prior art process, and in the process of Heo et al it is not formed(Fig. 8).

Allowable Subject Matter

Claims 10-18 are allowed.

Claims 2-6 ^{25 and 30} and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2825

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
1-4-2005

C. Everhart
CARIDADEVERHART
PRIMARY EXAMINER